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10/774,777	02/09/2004	Jovanie D. Claver	TI-35463	8846
23494 7590 07/28/2008 TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265				
EXAMINER				
TADAYYON ESLAMI TABASSOM				
ART UNIT		PAPER NUMBER		
1792				
NOTIFICATION DATE		DELIVERY MODE		
07/28/2008		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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### Office Action Summary

**Application No.**

10/774,777

**Applicant(s)**

CLAVER ET AL.

**Examiner**TABASSOM TADAYYON  
ESLAMI**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9-15 and 21-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) -15, 21-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

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1. Applicant's election of Group 2, claims 9-15 in the reply filed on 12/26/07 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### **DETAILED ACTION**

#### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yushito Ueoka et al (U. S. Patent: 6468893, here after Ueoka), further in view of Dennis L. Matthies (U. S. Patent Application: 2003/0010807, here after 807).

Ueoka teaches a method for forming ball grid array, comprising: providing a substrate; engaging a stencil (mask, 4a in fig. 1A) with a first surface of the substrate (2 in fig. 1A)[ column 9 lines 51-53, lines 65-66], depositing solder paste over the stencil (5 in fig. 1A)[ column 10 lines 8-15], removing the stencil (mask) [ fig. 1B, column 10 lines 17-17], thereby creating a plurality of solder paste regions on the substrate[ 5 in fig. 1B]; and coupling a plurality of solder balls to respective ones of the solder paste regions[ fig. 1F, column 12 lines 34- 42]. Ueoka does not teach the amount of the solder paste deposited at various locations on the substrate is a function of the extent of the warp of

the substrate. 807 teaches a method of making solder balls on a substrate [abstract lines 1-7]. 807 teaches depositing the paste on the substrate in such a way that the amount of the solder paste deposited at various locations on the substrate is a function of the extent of the warp of the substrate and with changing the volume of the solder balls the irregularity due to warpage will be disappeared (at least being in acceptable tolerance ranges) [0012 and 0013]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a ball grid array as Ueoka teaches where the volume of the solder balls are different (the opening of the mask is different) in different location of the substrate as 807 teaches, because almost all the substrate has some warpage associated with them.

3. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yushito Ueoka et al (U. S. Patent: 6468893, here after Ueoka), further in view of Dennis L. Matthies (U. S. Patent Application: 2003/0010807, here after 807), and Teddy D. Weygan et al (U. S. Patent: 6271109).

Claims 9, is rejected. Ueoka teaches a method for forming ball grid array, comprising: providing a substrate; engaging a stencil (mask, 4a in fig. 1A) with a first surface of the substrate (2 in fig. 1A)[ column 9 lines 51-53, lines 65-66], depositing solder paste over the stencil (5 in fig. 1A)[ column 10 lines 8-15], removing the stencil (mask) [ fig. 1B, column 10 lines 17-17], thereby creating a plurality of solder paste regions on the substrate[ 5 in fig. 1B]; and coupling a plurality of solder balls to respective ones of the solder paste regions[ fig. 1F, column 12 lines 34- 42]. Ueoka also teaches the mask has circular holes [column 9 lines 51-54]. Ueoka does not teach the

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detailed configuration of the mask (stencil). 807 teaches a method of making solder balls on a substrate [abstract lines 1-7]. 807 teaches depositing the paste on the substrate in such a way that the amount of the solder paste deposited at various locations on the substrate is a function of the extent of the warp of the substrate and with changing the volume of the solder balls the irregularity due to warpage will be disappeared (at least being in acceptable tolerance ranges) [0012 and 0013]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a ball grid array as Ueoka teaches where the volume of the solder balls are different (the opening of the mask is different) in different location of the substrate as 807 teaches, because almost all the substrate has some warpage associated with them. None of method of the above references specifically teaches the stencil having small holed formed in center area and larger holes in the outermost area. 109 teaches a method of making solder ball array [abstract lines 1-7]. 109 also teaches the warpage in must of the semiconductor substrate is in a way that the warped surface has an outward concave contour [column 2 lines 29-30]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of making ball grid package as Ueoka and 807 teach where the solder balls volume is smaller at the center area of the wafer rather than the outer most parts to increase the volume of the solder balls in the outer most areas and therefore the mask has to have larger size holes in outer most area compare to the center areas, because 109 teaches most of the wafers has warpage of concave outward.

Claims 10-12 are rejected. Ueoka, 807 and 109 teach the limitation of claim 9 as discussed above. They do not teach the specific design of the mask, however changing in shape or configuration of the mask does not have significant effect on the method of performing the process and a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant, In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) [MPEP 2144.IV.B] and the design of the mask needs to be selected based on the amount of warping that would occur between the two surfaces to be mounted. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of forming ball grid package as Ueoka, 807 and 109 teach where the shape of the mask and the arrangement of the opening is different than what Ueoka teaches, because the size of the holes on the mask and the detail configuration of the holes is result effective variable and changing the shape of the mask and arrangement of the holes need to be selected based on the amount of warping that would occur between the two surfaces to be mounted.

4. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yushito Ueoka et al (U. S. Patent: 6468893, here after Ueoka), Dennis L. Matthies (U. S. Patent Application: 2003/0010807, here after 807), and Teddy D. Weygan et al (U. S. Patent: 6271109), further in view of Weddie Pacio Aquien et al (U. S. Patent: 6403401, here after 401).

Claim 13 is rejected. Ueoka, 807 and 109 teach the limitation of claim 9 as discussed above. Neither of them teaches the mask is square in shape. 401 teaches a

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method of making ball grid array [column 1 lines 21-31] by depositing the solder balls on a substrate [where the pattern of the solder balls is in square shape, fig. 6b]. 401 also teaches using a mask (66) [fig. 5] for solder balls. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of forming ball grid package as Ueoka, 807 and 109 teach where the shape of the mask is square, because 401 teaches forming a square pattern of solder balls and therefore the mask is square.

Claim 14 is rejected. Ueoka, 807, 109, and 401 teach the limitation of claim 13 as discussed above. They do not teach the specific design of the mask, however changing in shape or configuration of the mask does not have significant effect on the method of performing the process and a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant, In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) [MPEP 2144.IV.B] and the design of the mask needs to be selected based on the amount of warping that would occur between the two surfaces to be mounted, in fact rearrangement of the position or parts would not modify the process of coating [MPEP 2144.01C]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of forming ball grid package as Ueoka, 807, 109, and 401 teach where the shape of the mask and the arrangement of the opening is different than what Ueoka teaches, because the size of the holes on the mask and the detail configuration of the holes is result effective variable and changing the shape of the mask and arrangement of the holes need to be selected based on the

amount of warping that would occur between the two surfaces to be mounted, and further rearrangement of the of the position or parts would not modify the process of coating.

5. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yushito Ueoka et al (U. S. Patent: 6468893, here after Ueoka), Dennis L. Matthies (U. S. Patent Application: 2003/0010807, here after 807), and Teddy D. Weygan et al (U. S. Patent: 6271109), further in view of Yezdi Dordi (U. S. Patent; 5835355, here after Dordi).

Claim 13 is rejected. Ueoka, 807 and 109 teach the limitation of claim 9 as discussed above. Neither of them teaches the mask is square in shape. Dordi teaches a method of making ball grid array [abstract lines 1-3] by depositing the solder balls on a substrate where the pattern of the solder balls is in square shape, [fig. 2-4]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of forming ball grid package as Ueoka, 807 and 109 teach and modify it to make the solder ball array of Dordi which is in square arrangement, therefore the shape of the mask taught by Ueroka is square, because Dordi requires forming a square pattern of solder balls.

Claim 14 is rejected. Ueoka, 807, 109, and Dordi teach the limitation of claim 13 as discussed above. Dordi teaches forming the center region be in square shape and forming the outer region to be in square shape [fig. 2]. In fact fig. 2 shows the image of the region, but for making the solder ball with mask as Ueoka teaches the shape of the mask inherently needs to be same as the region. They do not teach the specific design



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of the mask, however changing in shape or configuration of the mask does not have significant effect on the method of performing the process and a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant, *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) [MPEP 2144.IV.B] and the design of the mask needs to be selected based on the amount of warping that would occur between the two surfaces to be mounted, in fact rearrangement of the position or parts would not modify the process of coating [MPEP 2144.01C]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of forming ball grid package as Ueoka, 807, 109, and Dordi teach where the shape of the mask and the arrangement of the opening is different than what Ueoka teaches, because the size of the holes on the mask and the detail configuration of the holes is result effective variable and changing the shape of the mask and arrangement of the holes need to be selected based on the amount of warping that would occur between the two surfaces to be mounted, and further rearrangement of the of the position or parts would not modify the process of coating.

Claim 15 is rejected. Ueoka, 807 and 109 teach the limitation of claim 9 as discussed above. Neither of them teaches the mask is square in shape. Dordi teaches a method of making ball grid array [abstract lines 1-3] by depositing the solder balls on a substrate where the pattern of the solder balls is in square shape, [fig. 2-4] and the distance between each solder balls is 0.51 mm [claim 11]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have

a method of forming ball grid package as Ueoka, 807 and 109 teach to make the solder ball array of Dordi which is in square arrangement with the distance between the solder balls about 0.51 mm, and it is obvious to modify the mask taught by Ueroka to have the distance between the holes about 0.51 mm, because Dordi requires forming a pattern of solder balls with 0.51 mm distance between the balls.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TABASSOM TADAYYON ESLAMI whose telephone number is (571)270-1885. The examiner can normally be reached on 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tabassom T. Tadayyon-Eslami

Art Unit: 1792

Examiner  
Art Unit 1792

T.T

/Michael Cleveland/  
Supervisory Patent Examiner, Art Unit 1792